

Controlling Stress Evolution in Ceramic Thin Films and Coatings

Brown University: *Brian W. Sheldon (PI), Janet Rankin (co-PI), H. Li (post-doc), Ashok Rajamani and Sid Bhatia (grad stdts), Lisa Jog and Elyssa Monzack (undrgrds)*

Trinity College (Hartford, CT): *Barbara Walden (co-PI)*

- Compositional stresses occur in non-stoichiometric oxide films (i.e., where the lattice parameter varies with oxygen content, and the film is constrained by the underlying substrate).
- Time dependent stress evolution is monitored with a custom-built curvature system, permitting controlled atmosphere measurements at elevated temperatures.
- Diffusivities can be obtained from stress evolution (grain boundary diffusion is dominant for the case at the right).
- Materials of interest include TiO_2 , YSZ, and doped CeO_2 .
- Investigations include dopant effects, grain size effects, and stress effects on diffusion.

Compositional Stress in Anatase Films: Reduction at $P = 10^{-10}$ atm and 800°C

